Presentation Abstract

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Title **The Other Chemistry of the Jovian Icy Satellites - Low Energy and Sulfurous**

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Abstract Spectra of Jupiter's icy satellites reveal surfaces dominated by H_2O-ice with minor amounts of SO_2 and other materials. The co-existence of H_2O and SO_2 in surfaces exposed to jovian magnetospheric radiation suggests that sulfuric acid (H_2SO_4) also could be present. This was noted by Carlson et al. (1999), who supported this suggestion with assignments of near-IR bands in Europa spectra to hydrated H_2SO_4. Laboratory experiments since have demonstrated radiolytically-driven syntheses in S- and SO_2-containing H_2O-ices (Carlson et al., 2002; Moore et al., 2006).

In the Cosmic Ice Laboratory, we recently have investigated the *thermal* chemistry of SO_2 trapped in H_2O-ice. IR spectra of H_2O + SO_2 mixtures recorded at 10 to 230 K were used to follow low-temperature reactions in the absence of radiation effects. No SO_2 reactions were found at 10 K, but warming to more-relevant Europa temperatures produced both HSO_3^- and $S_2O_5^{2-}$. Added NH_3 shifted the product composition toward SO_3^{2-} and away from the other ions. We find that H_2O and SO_2 react to produce sulfur oxyanions, such as bisulfite, that as much as 30% of the SO_2 can be consumed through this reaction, and that the products remain in the ice when the temperature is lowered, indicating that these reactions are irreversible. Our results suggest that thermally-induced reactions can alter the chemistry at and below the surfaces of the icy satellites in the jovian system.

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References:

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Moore, M. H., Hudson, R. L., and Carlson, R. W., 2007, Icarus, 189, 409-423.

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